

## THE MOSQUITO LIFE CYCLE

Portions of this chapter were obtained from the University of Florida and the American Mosquito Control Association Public Health Pest Control site at <http://vector.ifas.ufl.edu/>.

Mosquitoes pass through four distinct stages in their life cycle: egg, larva, pupa and adult. Prodigious numbers of mosquitoes can hatch simultaneously under favorable conditions. In rapidly developing broods, survival of the immature stages can be quite high, but estimates for many species indicate that immature survival is normally less than five percent. However, five percent of millions still represents a sizable number. Further information on identifying and recognizing differences in mosquito species can be found in Chapter 5, Classification and Identification.

### Immature Stages

**Eggs.** White in color when first deposited, mosquito eggs darken within 12 to 24 hours. Those of most species appear similar to the naked eye, with the exception of the *Anopheles* species whose eggs have floats attached to each side. When viewed under magnification, however, eggs of different species can be seen to vary from canoe-shaped to elongate or elongate-oval in shape, laid singly by some species and glued together to form rafts in others. Eggs may be laid in batches from 50 to several hundred. The incubation period (elapsed time between oviposition and readiness to hatch) is dependent on environmental and genetic factors and varies considerably among different species.

Permanent and standing water species deposit their eggs directly on the water surface and these may hatch in one to four days depending on temperature. Many floodwater and container-breeding species deposit their eggs on moist soil or other wet substrates. These eggs may hatch within a few days after being flooded, or they may remain quiescent for a year or more. Thus in some species the egg is the overwintering stage. These quiescent eggs accumulate over time due to continued oviposition by blood-fed females. When temporarily flooded, they hatch, along with more recently deposited eggs. Populations can attain large numbers quickly this way.

**Larvae.** Larvae (wigglers or wrigglers) of all mosquitoes live in the water. Most larvae have siphon tubes for breathing and hang upside down from the water surface. *Anopheles* larvae lack a siphon and lie parallel to the water surface to get oxygen through a cluster of small abdominal plates. *Coquillettidia* and *Mansonia* larvae attach to plants to obtain their air supply.

Larvae feed on microorganisms and organic matter in the water. Most larvae are filter feeders, ingesting anything smaller than about 10 microns by vibrating their mouth brushes and sweeping in particulate matter and small organisms from the surrounding water. Larvae of some species (*Toxorhynchites* and *Psorophora*) are predacious and prey on other invertebrates, including mosquito larvae. Larvae require shallow, quiet water with no wave action and little or no current. Emergent vegetation, algae and organic debris provide food and shelter.

Larvae go through four stages, or instars, molting their skins four times and growing larger after each molt. Fourth instar larvae molt into the pupal stage. Fourth instar larvae are also used in identification keys. A few species overwinter in the larval stage.

**Pupae.** Unlike most other insects (think of the butterfly's cocoon), mosquito pupae can be very active and are often called "tumblers" because of their rapid, tumbling-like movement when disturbed. Mosquito pupae breathe through two respiratory trumpets when at the water's surface, do not feed, and typically transform into an adult in two or three days. This stage does not overwinter.

**Adults.** Adult mosquitoes are terrestrial and capable of flight. With piercing-sucking mouthparts, the female feeds mostly on animal blood and plant nectar. With piercing-sucking mouthparts, the females feed mostly on animal blood and plant nectar. Males' antennae have dense bristles, and their mouthparts are modified to suck nectar and plant secretions, where no piercing is required. Thus the male mosquito is not a pest and not a disease vector. The adults of some species remain within a few hundred feet of where they spent the larval stage, whereas others may disperse up to 50 miles or more.

With the exception of *Toxorhynchites* which feeds only on plant juices, female mosquitoes must acquire a blood meal for egg production; the eggs develop a few days after the female feeds. The female mates only once to fertilize her lifetime supply of eggs, but must obtain a blood meal for each batch of eggs. Females of some floodwater species may live up to a month after they emerge, whereas those of some permanent or standing water species can survive for several months by overwintering as mated, engorged adults.

